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21. BUTTERFLY MIGRATIONS IN THE NILGIRI HILLS OF SOUTH INDIA
(LEPIDOPTERA : RHOPALOCERA)

From 1954 to 1958 I lived in Kotagiri at 6500 feet in the Nilgiri Mountains (11°21' N, 76°54'E) of Tamil Nadu State, then Madras State, attending boarding school and leaving at the age of 14. The remarkable seasonal migrations of many species of butterflies fascinated me so much that for the last two years I kept a notebook on my observations which has unfortunately been long since lost. However, the memories remained vividly etched in my mind. As far too little has been published on this interesting phenomenon in India, especially by observers resident for several years in the same spot, the well-known authority on insect migration, Dr. C. B. Williams, suggested that I publish as much as I could piece together. Aided by notes in the margin of my copy of Wynter-Blyth (1957) transferred from my notebook before it was lost, by specimens remaining in collections made by me and schoolmates at the time, and by the kind assistance of my former headmaster, Mr. Ejnar Jensen as well as the contents of a stream of letters which he goaded me into sending to my parents at the time, the total picture emerged much more precisely than I had dared hope for. The data may be of assistance in unravelling one of the most interesting natural phenomena among the

Indian butterflies. However, it must be borne in mind that the observations were made by a boy between the age of 10 and 14 and that twenty years have since elapsed, so that although the total picture is valid enough the details must be treated with due caution.

Williams (1930) lists numerous recorded migrations from Sri Lanka while there are very much fewer from South India though the phenomenon should be equally important here. The most detailed observations are those made by Evershed at Kodaikanal in the Palni Hills (10°15' N, 77°31'E) and his material will be used for comparison (Williams 1927). All known migrations in India were summarised in 1938 by Williams since when major studies in this field do not appear to have been published. However, as this is not intended to be a review article no careful literature search has been made.

The school was situated in the deciduous woodland zone of the South Indian mountains where a number of Palaearctic relict species survive separated from the closest neighbouring populations 3000 km to the north in the Himalayas. Typical representatives were *Pieris canidia*, *Colias erate*, *Vanessa indica* and *Argynnis hyperbius*. Many species of Oriental origin did not normally penetrate to this height

and lower down on the Mettupalayam Ghat many species occurred which we never saw at Kotagiri.

Every year, probably in May, a prolonged migration lasting a month or more passed from the north towards south. The main components were the five Pierids *Appias albina*, *A. libythea*, *Catopsilia pomona*, *C. pyranthe* and *C. crocale crocale* as well as the Nymphalid *Phalanta phalanta*. These six must have accounted for three quarters of the total. *Hebomoia glaucippe* was a regular, but uncommon, member of the migrant stream. In addition at least the following species joined the main flight in smaller numbers: *Papilio crino*, *P. demoleus*, *Graphium nomius* (only 2 in 1957), *Euploea core*, *E. coreta*, *Euthalia nais* (very occasional), *E. lubentina* (occasional), *Ergolis ariadne*, *Cupha erymanthis*, *Cirrochroa thais* and *Precis almana*. Finally both the species of *libythea*, *lepita* and *myrrha*. On the whole the migrants behaved in the classical fashion, flying rather low, in a direct line, surmounting rather than avoiding obstacles, and rarely if ever settling to feed during the flight. Some of the *Catopsilia* and all the *Hebomoia* flew high. The direction of the spring flight was always the same. We used to collect in the school breaks on every sunny day and I remember never having been surprised on this count. It is perfectly clear that the direction of the flight cannot have been much modified by wind direction, though strong cross wind would lead to a considerable drift. On a good day one to four specimens would cross a 15 metre front every minute and although this is not an impressive density the migration was noticeable to the layman. How broad the total front was cannot be guessed at; judging from walks to Sunday school and church or to other collecting grounds the belt certainly stretched at least three kilometres to either side of the school. While there were variations from day to day and from year to year in the

density and composition of the flights the general impression was one of great regularity.

Once, almost certainly in October of 1957, there was a phenomenal migration of red-bodied swallowtails. Masses of *Atrophaneura hector* and *Pachlioptera aristolochiae* were flying south at a slightly different angle to that of the normal flight. The latter was slightly less abundant. The altitude of the migrants appeared to be 20-40 metres where they proceeded at a slow pace with hardly any movement of the wings. The visual effect was rather like that of bomber squadrons droning overhead on newsreels from the Second World War. The majestic procession stretched as far as the eye could see and lasted for at least five hours. Hundreds must have passed a hundred metre front every minute, and millions must have been involved. We were very keen to get some specimens, especially of *hector*, but not a single specimen descended from cruising altitude.

On the very same day there was a small migration of the Lycaenid *Jamides bochus* travelling towards the northeast. Though thin, the migratory movement was obvious since it was a butterfly which we rarely saw. On the same day there was a tremendous migration of dragonflies (Odonata, Anisoptera) travelling due south at a slight angle to that of the two swallowtails. Although dragonfly migrations were not very rare it is possible that the massive migratory movements of that day were prompted by some form of extraordinary meteorological conditions.

Most of the species so far cited as migrants had no regular breeding populations at this height and some never bred at all. In this sense they resemble migrants crossing the sea as they traverse long stretches of land unsuitable for breeding. We had breeding populations of a number of species which although prone to migration elsewhere we never encountered in the main flights, e.g. *Eurema hecabe*, *Danaus*

limniace, *Hypolimnas misippus*, *Vanessa cardui*, *Telchinia violae*, *Lampides boeticus* and others. Most of the *Precis* species have some migratory instincts, but apart from some *P. almana* I do not recollect them being associated with the flights.

I have little clear recollection of any autumn return flight. This does not necessarily mean it did not take place as we were attuned to the high density of the spring flights. The topography also would have made observations more difficult. However, I do remember collecting on a grassy slope from a stream of butterflies travelling towards the north or northeast on a few occasions and my notes say that there was a return movement of some *Appias* and *Catopsilia*. I have noted four species as having been encountered travelling in three or more directions at various times. They are *Euploea core*, *Euploea coreta*, *Jamides bochus* and *Cirrochroa thais* but the exact circumstances have been forgotten.

Compared to Evershed's observations on the Palni Hills the following points may be noted. Virtually all the species listed here were also encountered in the Palnis at the same time of the year, though *Precis* and *Danaus* species must have been under represented in the Nilgiris; certainly they never migrated in large numbers. The direction of the flights was not identical in the two areas and in the Palnis the September and October movements were stronger than those in spring. Taking also Sri Lanka data into account (Williams 1930) we find that all the species listed have been known as migrants elsewhere with the exception of *Euthalia lubentina*. Although we only saw it rarely it was a bona fide migrant. Together with *E. nais*, a known migrant, *lubentina* has the largest distribution area of the *Euthalia* and it is natural to link this with its migratory capacity.

How far the species fly, from where they originate, to where they go, and what triggers

such behaviour cannot be answered for the Nilgiris. It may be a movement from one flank of the mountains to the other to take advantage of seasonal rainfall but it is clear that a complex and substantial problem awaits a solution.

It may be appropriate to mention a few other unpublished migration records from other parts of India. Correspondence with a boyhood friend shows that he captured two female *Pieris brassicae* in Lodi Gardens in Delhi on 15 & 26.iv.1961. He caught a male *Argynnis hyperbius* in late March 1961 and I caught a few females in July, also in Lodi Gardens. Both species do not normally breed in Delhi but are restricted to the Himalayas where they breed above 3000 feet or so. They migrate towards the plains for hibernation. *P. brassicae* may breed on the plains, but *A. hyperbius* is most unlikely to find a suitable food plant as it appears restricted to violets. The presence of the latter in July in Delhi is doubly puzzling. Delhi is quite far south for both species to be found.

In April or May of 1958 on the plain just south of Mysore I encountered an enormous migration of *Euploea* (*core* and/or *coreta*) with a density high enough to make driving difficult. The direction of the flight was not determined. No other species were involved. Similar large migrations of *Euploea* have been recorded on other occasions on the plains.

SUMMARY

In this paper I have attempted to sketch the pattern of butterfly migration as observed during four years in South India. The general picture is fairly correct, but as twenty years have passed since the observations were made details may be wrong. It is even possible that the timing of the two seasons is reversed. However, I hope the data are interesting enough

to stimulate more research into the fascinating problem of butterfly migration by long term residents in a given area. Even for Sri Lanka,

where so much more information is on hand, the huge, annual flights remain for all practical purposes a mystery.

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22. ON THE OCCURRENCE OF DIMINUTIVE *POEKILOCERUS PICTUS* (FABR.) ADULTS IN NATURE

(With two text-figures)

Poeciloceris pictus (Fabr.) commonly known as painted or AK-grasshopper, occurs abundantly on *Calotropis* ('AK' or Akwan) plants in the bed and banks of river Fulgu (Gaya and Bodh-Gaya localities). Though size variations in the adults of this grasshopper have been frequently observed interestingly enough during field collection as well as in laboratory rearings a few adults of both the sexes attracted our attention by virtue of their being of abnormally smaller size. They were hitherto referred as 'diminutive' adults.

Among 235 adult specimens collected from the above localities in the month of June 1975, four diminutive adults were encountered. The sex ratio of these specimens was three males

and one female. They had imaginal coloration but out of four only two (males) possessed fully formed fore and hind pairs of wings and the remaining two individuals (one male and one female) had rudimentary wings which more or less resembled the nymphal wing pads (Fig. 1). They were approximately of the size of a 5th instar nymph. The size of the body of these individuals (♂, 26.00-28.30 mm, ♀, 32.5 mm) compared well with those of the 5th instar nymphs (see Pruthi & Nigam 1939).

In the following year (1976) 250 adults were raised in the laboratory from a stock of 280 nymphs of 3rd to 5th instars collected in the month of June from the same localities. Seven diminutive adult males and one such female